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Teachers' Views on Evolution: Religion Matters in South Korea

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Abstract

This work is the first extension in East Asia of the international research started with the Biohead-Citizen project on the analysis of teachers' conceptions of evolution. It presents the first results related to Buddhist teachers. The questionnaire, built and validated by the Biohead-Citizen project, and including 15 questions related to evolution, has been filled out in South Korea by 306 teachers (Primary Schools, Secondary Schools teaching Biology or the Korean Language). The results show that a majority of teachers are clearly evolutionist, including the Buddhist teachers who do not differ from their Agnostic or Atheist colleagues. Nevertheless, most of the Protestant teachers are radical creationist: their answers significantly differ from those of their colleagues. These results show a clear country effect, South Korea being economically developed, with 41% of teachers being Agnostic or Atheist, and clearly evolutionist, as are also their Buddhist or Catholic colleagues. Nevertheless there is also a religion effect, the Protestant teachers being fundamentalist and having radical creationist positions, that are also described in other countries where Protestant are fundamentalist, but not in European countries where Protestant are Calvinist or Lutheran.

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Keywords: South Korea; evolution; creationism; teachers; science and religion; Buddhism; fundamentalist Protestantism; Catholicism

1. Introduction

Teaching evolution is more and more difficult in various parts of the world, as pointed in 2006 by the InterAcademy Panel (IAP), representing 68 national science academies. We have to try to understand why, with the goal to improve biology education in all the countries because, as stated by Dobzhanski (1973) in his famous paper:

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“*Nothing in biology makes sense except in light of evolution*”. An international research on teachers’ conceptions of evolution in 18 countries started in the context of the Biohead-Citizen project (2004-2008: Carvalho *et al.*, 2008) and was then extended to other countries under the responsibility of P. Clément (Clément, Quessada & Castéra, 2013; Clément & Quessada, 2013: for 26 and 28 countries).

The present paper is an extension of this research in a new country, the first one investigated in East Asia: South Korea. Most of the countries until now included in this research were located in Europe and Africa, and also Middle East (Lebanon), and the results showed significant differences among countries: in less economically developed countries, teachers are more believing in God, more practicing religion, and are more creationist than in other countries, whatever is their religion. In consequence, conceptions of teachers belonging to the same religion strongly differ from one country to another (Clément, 2013; Clément & Quessada, 2012). Inside the same country, there is generally no significant difference among teachers related to their religion, with very few and little exceptions: for instance, in Lebanon, Muslim Sunni teachers are a little more creationist than their Christian colleagues, while they are less creationist in Burkina Faso (Clément, 2013). The most important difference until now observed in our present sampling concerns Brazil, where Protestant teachers are clearly more creationist than their Catholic colleagues.

The extension of our research in South Korea was very promising, because it is the first one investigating in East Asia, with part of its population being Buddhist (a religion until now not included in our sampling). South Korea is a well economically developed country (the GDP/capita was 23 837 \$ in 2013), and there is a diversity of religions that can a priori influence the teachers’ conceptions of evolution: this possible influence is our main question of research.

2. Methodology

The questionnaire in this study was built and validated inside the Biohead-Citizen research project (2004-2008: Carvalho *et al.*, 2008). It contains 15 questions dedicated to evolution, and 17 questions related to personal information (gender, age, education, religion, religious opinions, and so on). The formulation of some questions related to evolution is reproduced in the Figures 2 to 5. The collection of the filled questionnaire was totally anonymous (Clément & Carvalho, 2007). The sampling was the same as in other countries of the Biohead-Citizen project. The survey was administered during April 12 to May 16, 2013 for 5 weeks. A total of 308 teachers filled out the questionnaire and their biographic information is shown in Table 1. The data were then analyzed in France, using the software “R” for multivariate analyses (with the help of a statistician: Charline Laurent).

Table 1. Biographic data of Korean pre- and in-service teachers of biology, Korean language and primary

| Variables | Category | Number of teachers (%) | | | | | | |
|------------------------------------|------------------|------------------------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|
| | | preB* | preL | preP | inB | inL | inP | total |
| Gender | male | 13 (25.5) | 11 (22.9) | 15 (30.0) | 9 (17.0) | 12 (25.0) | 17 (34.0) | 77 (25.7) |
| | female | 38 (74.5) | 37 (77.1) | 35 (70.0) | 44 (82.0) | 36 (75.0) | 33 (66.0) | 223 (74.3) |
| | no response | - | - | - | 1 (1.0) | - | - | - |
| Highest degree earned in education | sophomore | 16 (31.4) | 15 (30.0) | 25 (50.0) | - | - | - | 56 (37.1) |
| | junior | 16 (31.4) | 19 (38.0) | 25 (50.0) | - | - | - | 60 (39.7) |
| | senior | 19 (37.3) | 16 (32.0) | - | - | - | - | 35 (23.2) |
| | bachelor | - | - | - | 23 (42.6) | 24 (45.3) | 21 (42.9) | 68 (43.6) |
| | master | - | - | - | 25 (46.3) | 25 (47.2) | 28 (57.1) | 78 (50.0) |
| | doctor | - | - | - | 6 (11.1) | 4 (7.5) | 0 (0.0) | 10 (6.4) |
| Age | mean (\pm SD) | 21.3 (\pm 2.5) | 21.1 (\pm 1.3) | 20.7 (\pm 1.7) | 41.9 (\pm 9.7) | 39.3 (\pm 9.3) | 39.9 (\pm 10.8) | 30.9 (\pm 12.1) |
| Total | | 51 (16.6) | 50 (16.2) | 50 (16.2) | 54 (17.5) | 53 (17.3) | 50 (16.2) | 308 (100.0) |

* preB is abbreviation for preservice biology teacher; inL is for inservice teachers of language of Korean, and P for primary.

3. Results

The declared religion by the 308 teachers is presented in Table 2. This repartition conforms similarly to the proportions of religions inside the total population (Korea World Mission Association, 2012, p. 181): 45% no religion, 20% Buddhist, 15% Protestant, 10% Catholic, 10% Other).

Table 2 – Religion declared by Korean pre- and in-service teachers of biology, Korean language and primary

| Category | Number of teachers (%) | | | | | | total |
|------------------|------------------------|-----------|-----------|-----------|-----------|-----------|-------------|
| | preB* | preL | preP | inB | inL | inP | |
| No religion | 27 (52.9) | 25 (50.0) | 27 (54.0) | 17 (31.5) | 19 (35.8) | 11 (22.0) | 126 (40.9) |
| Buddhist | 11 (21.6) | 6 (12.0) | 12 (24.0) | 16 (29.6) | 15 (28.3) | 15 (30.0) | 75 (24.4) |
| Protestant | 6 (11.8) | 7 (14.0) | 6 (12.0) | 7 (13.0) | 11 (20.8) | 12 (24.0) | 49 (15.9) |
| Catholic | 6 (11.8) | 5 (10.0) | 4 (8.0) | 5 (9.3) | 3 (5.7) | 5 (10.0) | 28 (9.1) |
| No answer/Others | 1 (2.0) | 7 (14.0) | 1 (2.0) | 9 (16.7) | 5 (9.4) | 7 (14.0) | 30 (9.7) |
| Total | 51 (16.6) | 50 (16.2) | 50 (16.2) | 54 (17.5) | 53 (17.2) | 50 (16.2) | 308 (100.0) |

* preB is abbreviation for preservice biology teacher; inL is for inservice teachers of language of Korean, and P for primary.

* The survey was administered in 2013 using the Biohead-Citizen research project questionnaire.

A Between-Class Analysis differentiating teachers depending on their religion (Figure 1) shows a very significant difference but coming only from the more creationist conceptions of most of the Protestant teachers (Figure 1-d).

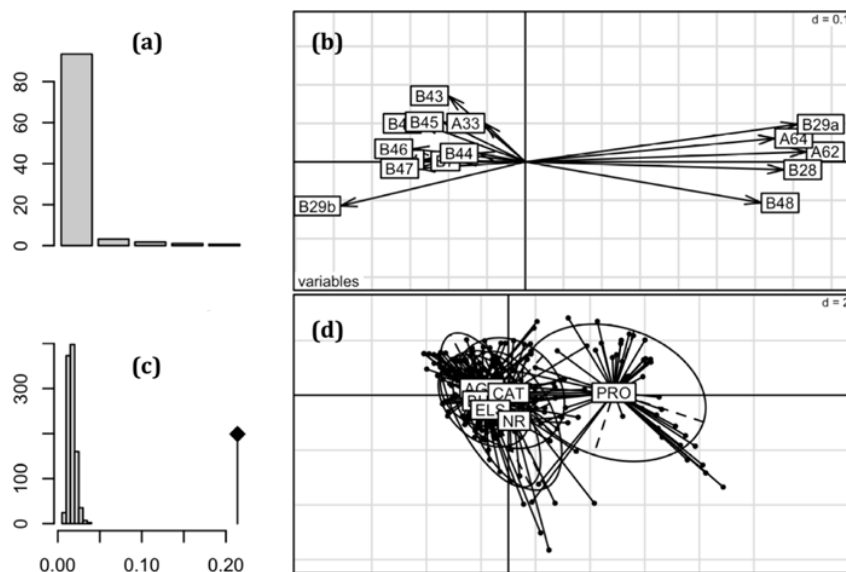


Fig. 1. Between-Class Analysis differentiating the teachers' answers grouped by teachers' religions.

(a) The first component (horizontal axis in graphs (b) and (d)) represent more than 90% of the total variance. (b) This axis opposes creationist conceptions (at right) to evolutionist ones (at left). The other questions (related to finalism or to knowledge of importance of different processes of evolution) have a less weight. (c) The differences between the groups of teachers is very significant ($p < 0.001$), the observed variance (point at right) being clearly outside the histogram obtained by 1000 essays assigning randomly a religion to each teacher (Monte Carlo test). (d) Only most of the Protestant teachers' conceptions differ to those of all their colleagues (each point represent a teacher, related to the centre of gravity of his / her religion).

The Figures 2 to 5 illustrate more precisely the teachers' answers to questions related to creationism. Concerning the questions A64 (origin of life) and B28 (origin of humankind), (the formulation of the questions are included in the caption of the figures 2 and 3), only 20% of Protestant teachers are clearly evolutionist (items 1 or 2), while their colleagues are mainly evolutionist (from 82% to 93%). The item 3 is at the same time evolutionist and creationist:

“The origin of life (or human origin) may be explained by natural phenomena that are governed by God”, and the item 4 is more radically creationist: “It is certain that God created life (or humankind)”. Half of the Protestant teachers ticked the item 4 while no one of their colleagues did that.

The Figure 4 illustrates the answers to the question A62, teachers having to choose three expressions associated with the origins of humankind, among six expressions (three linked to evolution and the three others to creation): the histogram (Figure 4) is quasi-identical to the histograms of the Figures 2 and 3. Only Protestant teachers (2/3 of them) chose three creationist expressions, while no one of their colleagues did.

These results are also correlated to the answer to the question B48 (importance of God in species evolution: Figure 5): more than half of Protestant teachers ticked “great importance” while only 0% to 3% of their colleagues did that.

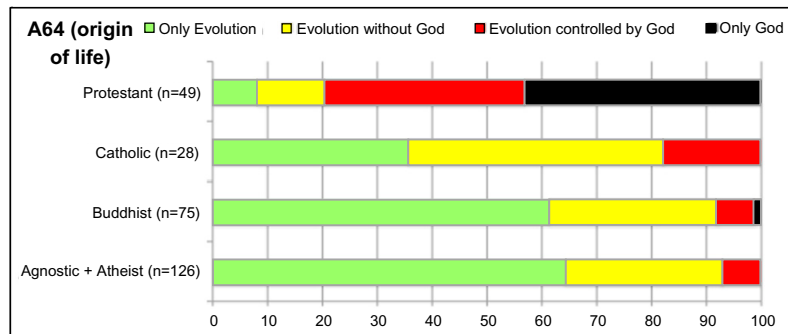


Fig. 2. Answers, grouped by the teachers' religions to the question A64:

A64. Which of the following four statements do you agree with the most? (tick only ONE answer)

- ☐ It is certain that the origin of life resulted from natural phenomena.
- ☐ The origin of life may be explained by natural phenomena without considering the hypothesis that God created life.
- ☐ The origin of life may be explained by natural phenomena that are governed by God.
- ☐ It is certain that God created life.

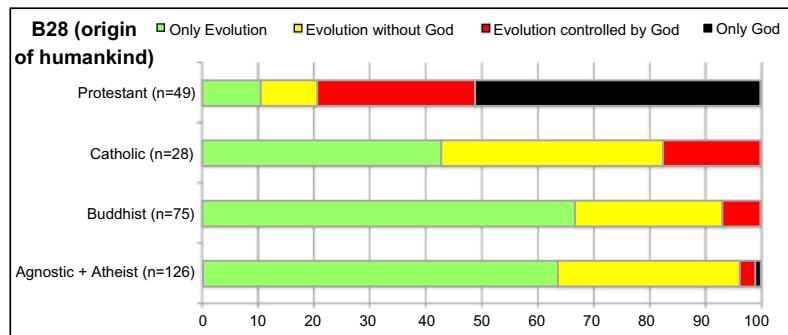


Fig. 3. Answers, grouped by the teachers' religions to the question B28

B28. Which of the following four statements do you agree with most? Select ONLY one sentence:

- ☐ It is certain that the origin of the humankind results from evolutionary processes.
- ☐ Human origin can be explained by evolutionary processes without considering the hypothesis that God created humankind.
- ☐ Human origin can be explained by evolutionary processes that are governed by God.
- ☐ It is certain that God created humankind.

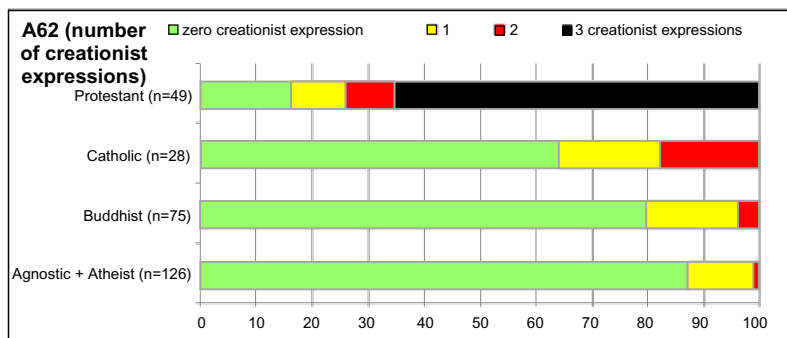


Fig. 4. Answers, grouped by the teachers' religions to the question A62

A62. In the list below, tick the **THREE** expressions that you think are the most strongly associated with the origins of humankind.

☐ Adam and Eve ☐ Australopithecus ☐ Creation ☐ Evolution ☐ God ☐ Natural selection

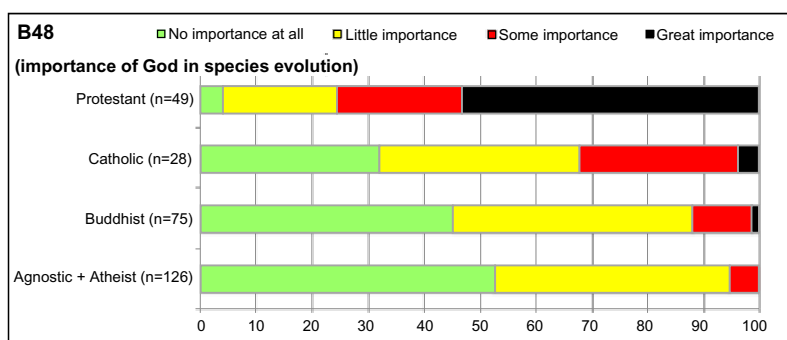


Fig. 5. Answers, grouped by the teachers' religions to the question B48

B48. Indicate your evaluation of the importance of God in species evolution (tick only ONE box for each line)

| | Great importance | Some importance | Little importance | No importance at all |
|----------|------------------|-----------------|-------------------|----------------------|
| B48. GOD | | | | |

4. Discussion

The Protestant religion was introduced in South Korea by American since 1884: it was initially Methodist or Presbyterian. Even today, most of the Protestant are fundamentalist in South Korea, and mostly radical creationist. In contrast, in Europe, most of Protestants are Lutheran or Calvinist, and are mainly evolutionist (Clément & Quessada, 2012). Catholic teachers are, in South Korea, mainly evolutionist, as are Catholic teachers in European countries (Clément & Quessada, 2012). Without surprise, Agnostic or Atheist teachers are clearly evolutionist, as in all the countries until now included in our international research.

The most new results concern Buddhist teachers: their answers do not significantly differ from those of their Agnostic or Atheist colleagues (figures 1 to 5). Nevertheless, two interpretations are possible: the Buddhist teachers' conceptions of evolution can be representative of the Buddhist religion (or philosophy); but they can also be representative of teachers' conceptions of evolution in economically developed countries, as is South Korea. To select one of these both interpretations, a new extension of our research will be necessary in a country mainly Buddhist and with economically developing countries.

The high percentage of Agnostic / Atheist teachers (41.2%) is similar in France, Spain, Denmark, Estonia and Sweden (between 37% and 56% in our samples), where most of the teachers are clearly evolutionist. This national

socio-cultural context can explain the high percentage of evolutionist conceptions inside Buddhist and even Catholic teachers, as a confirmation that the “country effect” is more important than the “religion effect” (Clément & Quessada, 2009, 2012; Clément, 2013; Clément et al., 2013).

Nevertheless, concerning the Protestant teachers in South Korea, the religion effect is here more important than the country effect. Fundamentalist Protestants seem to have the same characteristics across different countries, that we also observed for instance in Brazil (for Protestant pre-service teachers in Brazil, see also El Hani & Sepulveda, 2010), and that are regularly mentioned in the research done in US on acceptance of evolution by the total population or by the students (Baudouin & Brosseau, 2013; Forrest & Gross, 2004; Gould, 1983, 2000; Lecourt, 1992; Miller et al., 2006; Numbers, 2006).

Research on teaching evolution in Korea has examined various aspects. Majority of these studies concerned about how well students understand evolution without misconception (Ha & Cha, 2007; Jun & Hur, 1989; Lee, Lee, & Lee, 2007; Kang, 2010; Kim & Shin, 2009) with effective teaching materials and methods (Jung & Kim, 2009; Jung, Lee & Kim, 2010; Lee, Chung, & Kim, 1994). These studies indicate that most students understand the concept of evolution as scientific theory although somewhat various degrees of understandings and misconception were presented depending on their grade levels, gender difference, or major areas if it comes for high school or undergraduates. However, those some students who learn creationism prior to entering primary school seemed to have a mixed-up concept between evolution and religious faith. On the other hand, biology textbooks were often blamed for lack of students’ understanding or/and misconception of evolution, and such teaching strategies as using analogy, argumentation, inquiry, etc., providing extra evidence-based materials, and taking out museums were suggested for students’ better understandings of evolution.

A few studies directly dealt with religion effect on students’ conception of evolution reveal that religion can function as parameter. The study (Kang, 2010) examined 309 undergraduates’ perceptions of evolution and found that percentage of students with scientific understanding of evolution was higher in Buddhist (40.0%) than Protestants (35.1%; cf. no religion 38.3%). Kang’s results can be considered as parallel to the present findings of this study in some points. Another study (Ha, Cha & Ku, 2012) showed that Korean undergraduates’ degree of accepting evolution relates negatively to religiosity, which is similar to undergraduates in the United States. Both findings suggested that Korean biology curriculum needs an instructional strategy in developing students’ ability to make scientific decisions of accepting evolution, without interference from their personal religious belief.

However, other findings related to teachers’ perceptions to evolution did not show significant relationship with religion. Lee & Lee (2008) found that biology teachers were confused scientific meanings of evolution concept with non-scientific meanings used in daily life and expressed difficulties of teaching evolution in class. In Lee & Lee’s (2008) study, biology teachers pointed out that one of the reasons for having difficulties of teaching evolution is students’ religious belief, but not their religions. Rather those biology teachers criticized that biology curricular and textbooks in Korea do not provide various examples of evidence-based.

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